Research on Enterprise Financial Management System Based on Big Data Hadoop

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Abstract: With the development of economy, enterprises pay more and more attention to the construction of financial management system. However, as far as the current development of financial management system is concerned, there are still some problems, such as unclear financial system planning, imperfect financial data processing flow and low processing efficiency. Therefore, this paper constructs an enterprise financial management system based on big data Hadoop. This system takes Linus system as the bottom operating system, Java as the overall development environment of the system, and JDK version above 1.8 to keep the system running normally. Hadoop architecture is installed and deployed in JVM virtual machine environment, and components such as Flume, Sqoop, Hive, HDFS, MapReduce, SQL Server and Echarts are installed and deployed in turn according to the processes of data capture, data cleaning, data analysis and processing, data storage and data visualization, so as to realize the management and call of system data. The construction of the system can effectively improve the data storage performance and overall security performance of the financial management system, enrich the overall functions of the system, and make the working system of the financial management system more perfect.

1 INTRODUCTION

In the era of big data with the development of science and technology, the financial management system of enterprises has become the focus of enterprise modernization. Financial management lays the capital foundation for the subsequent development of the enterprise and determines the development prospect and direction of the enterprise. Excellent financial management system can improve the economic effectiveness of enterprises, avoid the financial risks of enterprises, and work out a long-term plan suitable for the development of enterprises. At present, China is in an important period of realizing the great rejuvenation of the Chinese nation, with the deepening of the reform of the economic system, and the state's requirements for the financial management of enterprises are more detailed. How to build a scientific enterprise financial management system is not only the focus of national development, but also the subject of this paper. However, as far as the current development form is concerned, there are still some problems in the enterprise financial management system. First of all, the financial management system planning is not clear, and the division of labor is scattered, which is difficult to meet the actual needs of users. Secondly, the processing flow of the financial management system is not perfect enough, which is easy to cause data loss and difficult to guarantee the accuracy of data results. Finally, the processing efficiency of the financial management system is low. The financial management system needs to convert the data with different formats into numbers and store them in the library. The existing financial management system is still using the old system, which leads to the poor effectiveness, low efficiency and insufficient intuitive data display of enterprise financial work. In view of the above problems, enterprises should actively cooperate with national policies, introduce advanced science and technology into the financial management system, and actively build an efficient enterprise financial management system.

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The financial management system does not simply organize and store unstructured data such as pictures and words. It can proceed from these unstructured data job scheduling and data parallel processing, and then adopt parallel processing and distributed storage according to the details and complexity of these data, so as to realize reasonable data management. The modern financial management system has promoted the progress of enterprises to a certain extent and improved the economic benefits of enterprises. Therefore, this paper believes that using big data technology, combining Hadoop with Web technology to build a web-based enterprise financial management system, relying on the advantages of big data technology in data quality, data effectiveness, data collection, data high-speed operation and calculation, etc., can realize the network, digitalization and intelligence of enterprise financial management business, and provide substantial reference for the successful construction of enterprise financial management system.

2 INTRODUCTION OF KEY TECHNOLOGIES

2.1 Big Data Technology

In the information age with the development of science and technology, data has gradually penetrated into all aspects of life. From work communication to daily chores, these bits and pieces of information data gradually form a huge data collection, that is, big data resources. This collection of data resources has the characteristics of large scale, fast circulation and various types. Because of its huge number, traditional data processing methods are difficult to process it in real time, so big data processing technology comes into being. Big data technology can explore the data set as a whole, extract key information from it, and then recommend activities according to users' daily usage tendency, which provides convenience for users' daily life. (Yang, 2018) With the improvement of social demand, big data technology has also been innovated and developed, so big data technology stack came into being. Big data technology stack can be divided into the following working layers in detail: data acquisition layer, data storage layer, resource management service coordination layer, calculation engine layer and data analysis layer. The specific structure is shown in Figure 1.

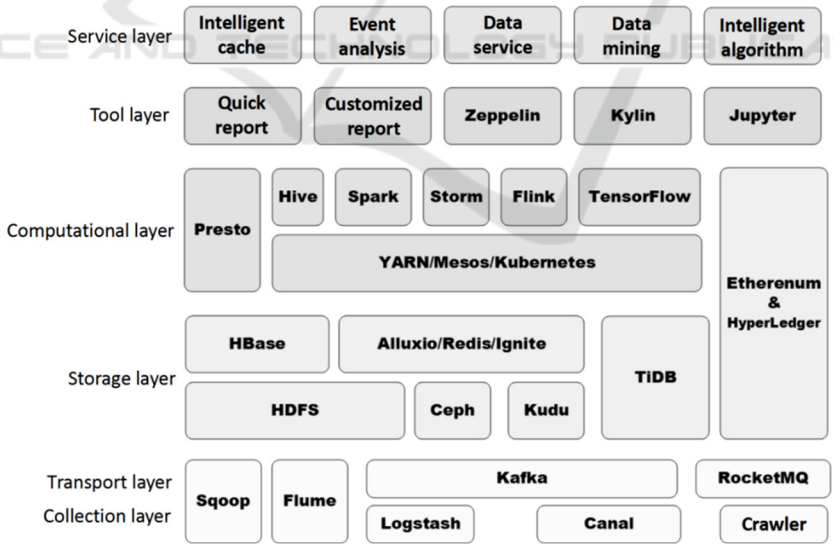

Figure 1: Structure diagram of big data technology stack (Source: https://blog.csdn.net/eternal_188/article/details/104940054).

2.2 Web Technology

Web is an application architecture based on the Internet, and its core is to provide users with various forms of information content and information services. With the rapid development and application of Web technology, the development and application of its architecture presents a trend from simplicity to

complexity. In the development process of Web server-side technology, the core of Web back-end development technology is to use a variety of object-oriented programming languages to complete the development of server-side functions. The content involved in the development is rich, including business logic, data storage and message queue processing, as well as the design and definition of several data interfaces, such as Web front-end interface, third-party interface, server internal interface, etc. The emergence of CGI technology has changed the situation that Web servers can only transmit static files. By executing external programs through CGI, the external programs can generate dynamic HTML pages according to the content of Web requests, thus realizing the dynamic information exchange between the client and the server. Since then, Web server-side development technology has entered the era of framework and template, and the auxiliary development technology of Web has increased the convenience for users to develop Web programs and improved the overall efficiency of program construction.

2.3 Hadoop

Hadoop is a software platform used to analyze and process big data. With the help of Java language, open source distributed system infrastructure is built. Users can process distributed programs with complicated data on this platform, and realize parallel high-speed operations and complex calls to big data. Hadoop architecture has become the most popular big data analysis system because of its low development cost, strong extensibility and high fault tolerance. As a multi-component architecture, it mainly includes core components such as HDFS, MapReduce, HBase, and other plug-ins with data capture or transmission functions such as Sqoop and Flume. (Wei, 2021) The deployment of various components can provide many functions for Hadoop architecture, and Hadoop architecture is the core of the ecosystem. The overall framework of Hadoop is shown in Figure 2.

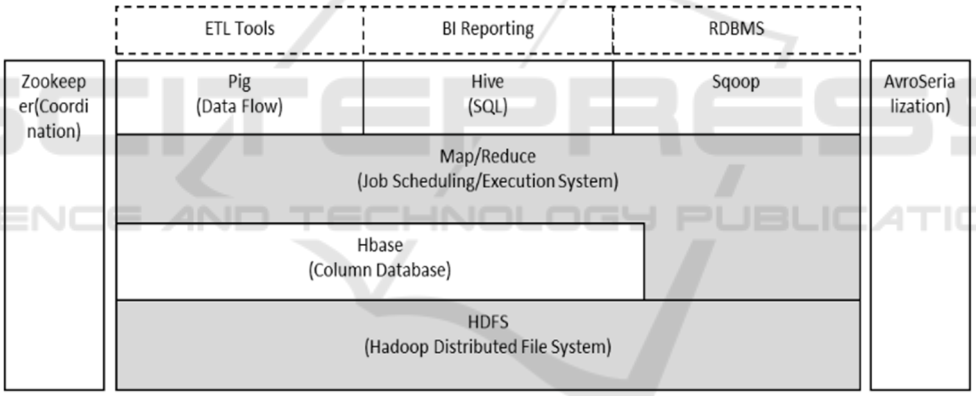

Figure 2: Overall framework of Hadoop (Source: https://blog.csdn.net/w12345_ww/article/details/51910889)

2.3.1 HDFS

HDFS is composed of a Namenode node and several Datanode. In the process of system operation, it usually runs in the mode of manager and worker. Namenode is the manager of the cluster, responsible for managing the namespace of the file system and maintaining the metadata of the file system. Datanode is the storage node of data, and it is also the worker of the cluster. The data will be divided into multiple file blocks with the size of 64MB, distributed on multiple machines, and its own storage information will be sent to Namenode regularly.

2.3.2 MapReduce

When Mapreduce calculates files, it will read them line by line and process them in batches. The execution process of Mapreduce task can be divided into map stage and reduce stage. The input data of the Map stage are files stored on HDFS, which will be divided into multiple file blocks, each file block corresponding to a map process.

2.4 Development Environment

According to the above application requirements, we can build and deploy the development environment. Under the hardware environment, Linus system is

adopted as the bottom operating system of the system, Java environment is used as the basic development environment, and JDK version 1.8 or above is selected to facilitate the subsequent software installation. Hadoop's overall architecture is installed and deployed in the JVM virtual machine environment, and components such as Flume, Sqoop, Hive, HDFS, MapReduce, SQL Server and Echarts are installed and deployed in turn according to the processes of data capture, data cleaning, data analysis and processing, data storage and data visualization. With the help of the structure of the system, it is layered one by one, so as to realize the analysis and call of the data belonging to the business system, financial system and other management systems by the enterprise financial management system, and ensure the overall efficiency of enterprise work. In the overall development process of the system, the big data technology represented by Hadoop architecture is deployed on the Web server, and then Nginx is selected as the Web server, so as to improve the system's handling of static data content and control the number of concurrent operations of the system as a whole. SQL Server is selected as the database server, Java language is selected as the system development language, JSP technology is selected as the Web client page, and then Java language and HTML language are used to complete the basic construction of the system page. Through the introduction of the above key technical theories, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of the overall project of building enterprise financial management system is also clarified.

3 SYSTEM REQUIREMENTS ANALYSIS

At present, China's economic system reform is gradually deepening, and the state has put forward higher requirements for the development of enterprises. Because financial management runs through all the work of enterprise management, financial management is the foundation of enterprise management and development. Enterprises should follow the trend, upgrade the original management system with the help of new scientific and technological means, and build a scientific financial management system. How to manage enterprise finance efficiently needs to grasp the enterprise financial theory and capital structure, and make the next planning according to the practical experience of enterprise financial management. (Li, 2013) Based on the big data technology, the enterprise financial management system will meet the enterprise's demand for refinement of its own management, and achieve the whole process control of the enterprise's daily production and operation management activities, such as planning beforehand, being cautious in the process and summarizing afterwards. Compared with the conventional financial management system, the financial management system combined with modern technology constructed in this paper can rely on network information technology and big data analysis and processing technology to collect and analyze all the data related to the development of enterprise production experience management. It can thoroughly solve the problem of data disconnection between various business departments and financial departments of an enterprise, improve the situation that enterprise managers or decision-makers only rely on financial and accounting reports to obtain the business development status of the enterprise, effectively realize the deeper integration of business and financial information, and provide timely, accurate, comprehensive and personalized information or reports to all responsible units, departments and management within the enterprise by orderly processing and transmitting relevant data.

4 FUNCTION REALIZATION

4.1 Financial Side

4.1.1 Voucher Management Module

When users use the system for the first time, they first need to complete the user registration according to the relevant guidance given by the page, and then they can log in to the system for subsequent operations. The login code is shown in Figure 3. Under this module, accounting vouchers are divided into paper vouchers and electronic certificate vouchers. After the user enters the paper voucher, click the proofreading button, and the system will proofread the entered information in the manuscript accurately, and any errors will be marked with red letters. This module also has two modules: voucher posting and voucher auditing. Users can generate corresponding bookkeeping vouchers for the entered and approved vouchers, and then collect them in the library for classified storage. When querying, enter the date or voucher number in the search field to query.

```
public class DB {
    //Define connection objects.
    private Connection conn = null;
    //Define the statement to be compiled
    private PreparedStatement psmt=null;
    //Define result set
    private ResultSet rs=null;
    public Connection getconn() {
      try {
          String password="";
          //Read connection database information from XML configuration file
          DocumentBuilder db = DocumentBuilderFactory.new Instance()
                  .newDocumentBuilder();
          Document doc =
Db.parse("../webapps\\LearnSystem\\WEB-INF\\database.xml");
System.out.printIn(doc.getElementsByTagName("serve" ).item(0).getParentNode().getNodeName());
        String database = doc.getElementsByTagName("database").item(0).
```

Figure 3: System accession code (Original).

4.1.2 Financial Revenue and Expenditure Module

Users can use this module to record the daily transactions of enterprises, which can be divided into two parts: financial revenue and financial expenditure. In financial revenue, users can use the module scanning function to convert paper documents into electronic data and store them in the library, which is easy to find. The financial database will divide the income data according to the time and type, generate the income report in the fixed node, and submit it to the report management module for the enterprise leaders to consult. In financial expenditure, users can query the capital flow according to expenditure records. (Gui, 2013) With the function of this module, users can generate revenue and expenditure comparison reports according to the needs of enterprises, and then upload them to the report management module for subsequent comparative review. The upload code is shown in Figure 4.

```
public class CopyToHDFS {
    public static void main(String[] args) throws IOException {

        Configuration conf = new Configuration();
        conf.set("fs.defaultFS", "hdfs://active.namenode.host:9000");

        FileSystem fs = FileSystem.get(conf);

        fs.copyFromLocalFile(new Path("/home/lance/log.txt"), new Path("/log"));
    }
}
```

Figure 4: Report upload code (Original).

4.2 Leadership Side

4.2.1 Report Management Module

Under this module, the system will automatically generate reports according to the entered trade information, which can be divided into daily reports, profit distribution statements, cash flow statements, etc. These statements can intuitively reflect the business status and financial revenue and expenditure of an enterprise, and users can choose the generation of data charts according to their personal needs, such as line charts, pie charts or bar charts. (Zhang, 2014) This system omits the process of data operation, and turns the data results into charts and graphs, which can be displayed to users more intuitively, so as to compare with the previous data and make a more detailed development plan for the subsequent development of the enterprise.

4.2.2 Foreground Building Module

Under this module, users can use the query function in the system to obtain the required financial data of internal and external departments of the enterprise. The function of this module is to use Flume to capture the data of each system's log files, then use Sqoop to transmit the data of each business system, financial system, management system, accounting system and external database, and then use the web crawler in Scrapy framework to capture and collect the unstructured data. When the whole data is extracted, it is stored in the distributed file system, waiting for the system to analyze and process the data in more detail. Finally, through the analysis and calculation of MapReduce or Spark and other computing engines, the corresponding data analysis results are formed, and the report contents are presented in visual data charts. According to the report content formed by the system, the enterprise can make a detailed analysis of the future development strategy and formulate a long-term business strategy to ensure the stable development of the enterprise.

5 CONCLUSIONS

In the Internet era of big data development, developing new system programs based on various data has become the focus of modern enterprise information construction. The enterprise financial management system based on big data Hadoop constructed in this paper integrates big data technology with enterprise financial management, which can effectively improve the data storage performance and overall security performance of the financial management system, enrich the overall functions of the system, and make the working system of the financial management system more perfect. At the same time, it also improves the business processing efficiency of employees, makes the financial management system of enterprises run more efficiently, and promotes the further development of enterprises. In the follow-up research, we will further expand the extensibility and applicability of the system, and make the system function more perfect.

REFERENCES

Gui Jing. (2013) Design and Implementation of Financial Management System for Small and Medium-sized Enterprises[D]. Xiamen University.(05).

Li Dan. (2013) Design and Implementation of Financial Management System for Small and Medium-sized Enterprises[D]. University of Electronic Science and Technology of China.(01).

Wei Pengjuan. (2021) Key Technologies of Web Front-end Development[J]. Electronic Technology & Software Engineering.03.

Yang Yi. (2018) Introduction to the Basis and Application of Big Data Technology[M]. Beijing: Publishing House of Electronics Industry.07.

Zhang Zhe. (2014) Design and Implementation of Enterprise Financial Management System[D]. Jilin University.